3

3.0 Issues

The Council has discussed the issues reported in this chapter. Recommendations that address some of the issues are included in Chapter 4.0 and are cross-referenced in this section.

3.1 Future-Conditions Hydrology

Flood Insurance Studies (FISs) and Flood Insurance Rate Maps (FIRMs) are developed using existing hydrologic conditions in the watersheds and existing hydraulic conditions in the floodplains. Many conditions can change a floodplain boundary once it is mapped. Man-made changes such as watershed urbanization, new bridges, changed agricultural or forestry practices can alter floodplains.

Natural changes also alter floodplains, such as erosion or flood deposition, wildfires and earthquakes. Approximately 45 percent of the current flood maps are at least ten years old and 70 percent are five years or older. Periodic map updates were planned, but budget constraints prevent sufficient frequency of updates to reflect changing flood hazards, either manmade or natural.

Mapping 100-year (1%-annual-chance) floodplains using future-conditions hydrology shows what the floodplain will look like when maximum anticipated build-out occurs in the watershed. Proactive communities have predicted or are able to predict how future development will occur and can calculate the impact future development will have on run-off and its effects on flood discharges. While communities can receive points under the Community Rating System (CRS) that result in lower flood insurance policy premiums for using future-conditions hydrology, these calculations have not been used by FEMA in FISs.

In its 1998 report, the Council suggested that FEMA address future watershed development and changing land-use conditions that result in increased flood discharges. FEMA, as part of its Map Modernization Plan (MMP) prepared *Recommendations for Using Future-Conditions Hydrology for the National Flood Insurance Program*. This report researched the issues and recommended displaying 100-year floodplain boundaries based on future-conditions hydrology in lieu of the 500-year (0.2%-annual-chance) floodplain boundary. The future-conditions 100-year floodplain boundary would be shown on FIRMs only in communities that request it for regulatory purposes. The use of future-conditions floodplain boundaries would not be used for insurance, but would be available for informational purposes.

The Council, however, was concerned that excluding the 500-year floodplain on the FIRMs would not be appropriate. Some states and communities regulate land-use in the 500-year floodplain, particularly for critical facilities such as hospitals and emergency government facilities. A policy that excludes the mapping of the 500-year flood boundary on FIRMs would undermine those efforts. Additionally, mapping the 500-year floodplain boundary provides warning to communities and the general public of the possible danger that they may experience outside of the 100-year floodplain. The issue then becomes how to display this information. The preferred solution is to show all three floodplain limits where feasible, but only show the 100-year and future-conditions 100-year where the 500-year and future-conditions 100-year areas are nearly identical.

See Recommendation 4.1.

3.2 Unnumbered A-Zones (No Base Flood Elevations)

When the Federal Insurance Administration began producing floodplain maps in the late 1960's under the emergency phase of the National Flood Insurance Program (NFIP), most floodplain areas in the nation were delineated as Unnumbered A-Zones. These are approximate floodplain delineations without Base Flood Elevations (BFEs) or, in most instances, technical information (hydrology, hydraulics, flood profiles, etc.) to accompany and support them. A substantial inventory of existing maps still includes such Unnumbered A-Zone delineations. The Council believes that it is important to address the issue of how best to utilize and improve these existing maps in a cost-effective manner.

The difficulty in relating the boundaries of Special Flood Hazard Areas (SFHAs) depicted on the FIRMs to features on the ground is complicated by the absence of BFEs. Surveyors, engineers, and planners have historically used a variety of approaches to try to duplicate the approximate limits of flooding depicted as Unnumbered A-Zones on the FIRMs, with varying levels of accuracy or consistency.

There are repercussions to the inaccurate approximation of both horizontal location and BFEs of the SFHA. Horizontal inaccuracies lead to inappropriate flood insurance purchase decisions. The lack of BFEs affects insurance premiums as well as the design of hydraulic structures and buildings. It also leads to improper new construction in areas that are not accurately mapped.

Approximate determination of SFHAs, or Unnumbered A-Zones, affects many people and drains our resources. Some affected parties include:

1. Property owners who do not buy flood insurance but should;
2. Lending institutions that do not require proper coverage on their collateral;
3. Government and emergency relief agencies that find their disaster relief funds stretched when insurance is not properly purchased; and

4. Local community planning agencies that experience more difficulty performing their development review, floodplain management, and emergency preparedness functions when flood hazards are improperly identified.

Four general techniques are utilized for interpreting Unnumbered A-Zone delineations; all are approximate techniques. Each technique provides results that are less accurate than detailed studies. None of these techniques provide accurate results when used by people without adequate professional training. Some of them are inapplicable or of limited value for certain watersheds.

1. **Scaling Distances.** Scale floodplain boundaries from known cartographic features such as roads or section lines (this technique frequently presumes a level of precision in the floodplain boundaries that is simply unwarranted).
2. **Estimating Ground Elevations.** Estimate elevations of the floodplain by matching ground contours at the edge of the floodplain, utilizing available sources of topographic information (use of this technique requires verification that there is a reasonable relationship between the floodplain boundaries and available topographic data).
3. **Estimating Depth of Flooding.** Estimate depths of flooding above the channel bottom based on empirical relationships such as depth of flooding versus size of drainage area (this technique should not be used unless a relationship has been established between the stream reach being studied and other similar stream reaches for which detailed streamgage information and/or detailed hydraulic analyses are available to support depth assumptions).
4. **Estimating Flows.** Estimate 100-year flow through empirical relationships and then use approximate techniques to estimate depth of flooding, taking care to verify stream and energy slope assumptions.

Techniques 1 and 2 are the most approximate, the most subjective, and the most prone to presenting inaccurate assessments of flood hazards on a site. However, these are the techniques most frequently utilized in completing elevation certificates when base flood elevations are not available. It is important that lenders, property owners, consultants, local officials and state officials understand and acknowledge the limitations of these techniques. The use of detailed hydrologic and hydraulic analyses is the most accurate method of interpreting SFHA delineations, and it is the recommended approach whenever possible.

Council discussions this year covered a variety of approaches for improving FIRMs that currently include Unnumbered A-Zones, as well as ways to assist those who must utilize such maps. The lack of sufficient background information to support these approximate delineations is a significant problem to overcome in reproducing Unnumbered A-Zone delineations or in supplementing those delineations with newer or more detailed data. FEMA should investigate the following approaches for improving Unnumbered A-Zone delineations and data:

1. **Preparation of a Flood Insurance Study (FIS) Report.** Unnumbered A-Zone delineations should always be accompanied by an FIS report that provides a description of the information shown in the Unnumbered A-Zones, and should include the following information:

- Identification of the sources of all present Unnumbered A-Zones, or notation that the source is unknown (existing FIS reports should be updated to include this information);
- Approximate or detailed hydrologic information including flow values and sizes of corresponding drainage areas and a description of hydrologic methodologies used (in some instances an approximate hydrologic analysis may be sufficient, along with a description and tabulation of historic high water marks, if available);
- Discussion of the hydraulic methodology utilized;
- Description of the topographic mapping used;
- Description of hydraulic structures that may cause or worsen flooding problems (such as undersized culverts);
- Discussion of the base mapping on which roads and other cultural features are depicted; and
- Description of where and how to obtain backup information, including all calculations.

2. **Detailed Analyses Prior to New Development.** Communities allowing development in areas that contain Unnumbered A-Zone delineations must require the developer to complete hydrologic and hydraulic studies to eliminate these approximations for all subdivisions of 5 acres or 50 lots. FEMA should educate communities about this requirement. In addition, communities should require such detailed hydrologic and hydraulic studies for other development activities whenever these activities are proposed in Unnumbered A-Zone areas. Any party, whether public or private, proposing to construct a bridge, culvert, channel encroachment or other facility that affects hydraulic conditions in Unnumbered A-Zones should be required to submit detailed hydrologic and hydraulic analyses. Communities should require the developers to forward these studies directly to FEMA for map update upon completion of stormwater management facilities related to the development. This action should be a requirement for participation in the NFIP. Currently, communities are required by federal regulations to submit information within six months of completion of projects affecting floodplains, but this is neither enforced nor specifically encouraged.
3. **Submitting Elevation Certificates**. Communities maintaining files of elevation certificates should submit this information during any restudies or updates of the FIRMs for that community. The “as-built” ground elevations and building elevations contained in the elevation certificates should be used to enhance the approximate floodplain information to the extent possible. If a community can refine the definition of its Unnumbered A-Zone SFHA through the use of elevation certificates, there should be CRS credit given upon submission of this information to FEMA.

4. **Incorporation in the Mapping Needs Update Process.** Communities going through the Mapping Needs Update review process should identify the percentage of their identified flood hazards that are Unnumbered A-Zone delineations, and this percentage should be weighted in the determination of priorities for mapping revisions.
5. **Training for Floodplain Managers and Engineers.** The interpretation of Unnumbered A-Zone information is a significant task and performing this interpretation satisfactorily is difficult. Workshops or brochures should be available to train floodplain managers to better update their FIRMs. Material should include rudimentary hydrologic and hydraulic analysis, topographic modeling (including use of digital terrain models), visual on-site inspection, and other accepted methodologies. Communities that undertake such training for their floodplain managers could be eligible for CRS credits.

FIRMs are intended to serve several planning and management objectives. These objectives include the provision of hydrology, the facilitation of flood determinations and, in certain instances, the provision of approximate or detailed flood elevations. All new floodplain studies performed for Unnumbered A-Zones should provide sufficient detail to meet these objectives, whether those new studies are detailed studies or approximate studies that have been enhanced with sufficient detail to meet the objectives. In addition, the new studies should assure that there is consistency internally among the three basic elements of the study: hydrology, topographic information, and hydraulic analyses. Those same three elements within the new studies, and in any adjacent studies, should also be consistent.

The many number of map panels that contain Unnumbered A-Zones serve a valuable function. Even given the real and imagined errors contained in the maps, they force users to consider carefully whether to buy property or build on it. However, these Unnumbered A-Zones represent an enormous challenge for FEMA, local and state floodplain managers, lenders, and the public.

See Recommendation 4.2.

3.3 Alluvial Fans

Alluvial fans are depositional landforms located at topographic breaks such as the bases of mountain fronts, escarpments, or valley sides. They are composed of streamflow and/or debris flow sediments. They are called "fans" because they have the shape of a fan, either fully or partially extended. Floodplains associated with alluvial fans are very different from floodplains associated with rivers and streams. The result is that the mapping of these hazards and the utilization and revision of the maps is correspondingly different. Because many rapid growth areas of the country, particularly in the western United States, include alluvial fans, it is important that the mapping of flood hazards in and adjacent to alluvial fans meet the needs of local, state and federal authorities, and other map users. In addition, it is important that the relationship between the mapping of these hazard areas, the regulation of the hazard areas, and the provision of insurance within the hazard areas be clear and strong. There must be a technical basis for the maps, the regulations, and the insurance rates.

3.0 Issues

Unlike a riverine floodplain, where an individual 100-year flood event can reasonably be expected to occupy the entire mapped floodplain, circumstances for alluvial fan flood events are quite different. At the apex of the fan (the mouth of the canyon where the fan begins) an individual flood event may go to the left, to the right, or straight, depending on the structure of the fan and on somewhat random factors. The entire area subject to the possibility of a flood or a very large portion of that area may be mapped as part of the floodplain, even though any one event will only occupy a part of the floodplain. In addition, other random factors may mean that the depth of water and debris in specific locations may vary from one 100-year flood event to another.

This element of probability, as determined by geologic factors that can vary from one event to another, means the maps display a substantially different kind of hazard from riverine floods. One important consequence of this fundamental difference is that alluvial fan floodplains have a much larger areal extent, for the magnitude of 100-year flow, than conventional riverine floodplains. Another important consequence is that floodprone property and the structures on that property (buildings, bridges and culverts, floodwalls, flood channels, etc.) may face the likelihood of experiencing the deposition of a substantial amount of mud, rocks, trees and other debris, in addition to the water. A related consequence is that mitigation approaches to these flood hazards often differ from mitigation approaches to riverine flood hazards. Finally this fundamental difference raises questions about how to develop appropriate insurance requirements within the hazard areas. In its discussion the Council identified four areas of concern:

1. **Definitions for Alluvial Fan Flooding**. Historically there were not standard definitions of alluvial fans, alluvial fan floodplains and other important terms, agreed upon by local, state and federal agencies and the private sector;
2. **Incorporation of Geological and Geomorphological Analyses.** Conventional mapping methodologies generally made limited use of information and techniques from geological and geomorphological analyses and relied primarily on engineering approaches;
3. **Development of Technical Guidance and Criteria for Computer Modeling.** There was not a standard set of "rules" (technical guidance and criteria) for the application of computer models and other analytical tools to the mapping of alluvial fan floodplains;
4. **Relating Regulations and Insurance Requirements to the Maps.** Given the substantial differences between alluvial fan floodplains and riverine floodplains, there has been no direct relationship between floodplain regulations and flood insurance requirements for alluvial fans and floodplain mapping for alluvial fans.

FEMA's July 17, 1999 publication, *Guidelines for Determining Flood Hazards on Alluvial Fans*, addressed the first three of the above four concerns. Through workshops, regional gatherings, mailings, and other means of contacting interested parties, FEMA publicized the *Guidelines* and their contents in advance of the formal adoption of the *Guidelines*. Already some local governments are using the *Guidelines* to steer their own efforts to map alluvial fan floodplains and FEMA will be using the *Guidelines* to direct future floodplain studies. The process of formally notifying local governments, state governments, consultants and other interested groups should be continued in order to enhance the implementation of the *Guidelines.* States and local

governments whose jurisdictions include areas subject to alluvial fan flooding and associations of professionals who map alluvial fans (engineers, geologists, geomorphologists, hydrologists) should be specifically encouraged to formally adopt the guidelines.

See Recommendation 4.3.

3.4 Multiple Hazards Affecting Flood Risks

FEMA's FIRMs typically show no hazards other than riverine and coastal flooding. In some communities the flood hazards that pose the greatest risk to human safety, for example, tsunamis and dam failure flooding, are not shown on FIRMs. The Council has considered suggestions that other hazards be shown on the maps to make it easier for emergency managers and other users to address all hazards. Some hazards suggested for inclusion on FIRMs are tsunamis, debris flows, earthquake zones, and flood hazard information related to wildfires. Other hazards that could also be shown are the additional flooding that could result from the normal operation of a dam or a dam failure, future-conditions floodplains, wildfire hazard areas, erosion hazards, and flood hazards associated with reduced channel capacity due to sedimentation.

An example of the potential threat these types of hazards pose is reflected in a recent issue paper written by the U.S. Bureau of Reclamation for the Western Governors' Association. The paper spells out in alarming detail the hazard posed by the normal operation of some dams. People have built homes and businesses downstream of dams that for years have reduced the peak discharges to the streams or rivers upon which they are constructed. The new development has severely restricted the ability of the dam operators to pass flood flows, causing the dams to now pose a greater threat of potential failure.

A different example is the threat posed by increased watershed runoff after a wildfire. In some cases, wildfires have altered the watershed characteristics so severely that runoff rates are multiplied by a factor of 30 to 50. In addition, the risk of debris flows is greatly increased. The possibility of easily linking graphical databases of wildfire risk with similar databases of flood risk should be examined.

Two arguments have been used to oppose the incorporation of other hazards onto FIRMs. First, FEMA's Office of General Counsel argues that FIRMs can only show existing condition floodplains based on floods resulting from a 100-year (1%-annual-chance) flood. This debate is based on the assertion that flood insurance can only be legally mandated within the 100-year floodplain. Second, some users of FIRMs argue that adding any more information on FIRMs would make them more difficult and confusing to read. Some have suggested that the current maps need to be made less, not more complex.

The Council has evaluated the current paper-based maps and the arguments opposing the incorporation of multiple hazards that would add complexity. The argument is centered around the inability to clearly portray multiple themes of information on a single graphic. With the launching of Digital Flood Insurance Rate Maps (DFIRMs) however, the graphic limitations of paper maps are no longer a factor in the amount of information that can be included in the DFIRM product. Numerous elements can readily be included as part of a digital file. Elements

such as the 1%- and 0.2%-annual-chance flood boundaries, floodways, cross sections, BFEs, Elevation Reference Marks (ERMs), Coastal Barrier Resource System (CBRS) areas, political boundaries (corporate and county boundaries), and FIRM panel neatlines are readily stored and available when needed or required. Similarly, maps can be printed or displayed to include only the selected thematic layers of information desired.

It is possible to expand the DFIRM database to include other hazard information. It would also be possible to include this information in another database and relate it to the information in the DFIRM database. For example, if tsunami risk information is georeferenced in a standard coordinate system, this information could be correlated to the flood hazard information in the DFIRM database. It would then be possible to display the tsunami data and the flood hazard information either independently or simultaneously over a given geographic area. Using software, such as that generally used in a Geographic Information System (GIS), it is possible to view selected themes of data over a given geographic area. Thus, multiple themes of hazard information can be collected and stored separately, yet displayed only when necessary over a geographic area of interest. The key is to develop the original maps in a format that lends itself to the addition of new layers of related information as they are developed.

See Recommendation 4.4.

3.5 Distribution of Data: Archiving, Map Availability, and Accuracy

The Mapping Council has previously expressed concern over incomplete archiving of past versions of FIRMs, FISs, and possibly other data defining the location of the legally defined floodplain in mapped communities. Reasons for having such data available may include:

- tracking of floodplain management activities and their effectiveness in mitigating flood damages;
- verification of a property's identified flood status over the life of a community's participation in the NFIP for insurance purposes; and
- identification of a property's identified flood hazard status over time for litigation purposes.

The Council acknowledges that there is a cost associated with archiving, and that there are presently few requests for older information. However the significance of data accessibility cannot be overlooked. The retrieval process is now scattered and not coordinated. Some data resides with the Map Coordination Contractors, some with community repositories, and some may only exist in the files of regular users of the maps. Presently there is a 2½ year gap in the microfilming of older FIRMs, and no well-defined retrieval method.

FEMA should set up an indexed retrieval system, and come up with a plan to fill in the gaps where data is missing. The retrieval system must strive for consistency and accessibility. The Council offers the following suggestions as a beginning point:

- The Map Service Center should identify and list missing maps, FISs, supporting technical data, and Letters of Map Change (LOMCs). It should also be able to provide information on how many and what kind of archival requests it has received, and this information can serve as a guide to planning activities.
- FEMA can post a bulletin board service (BBS) for flood map and data requests to supplement current in-house holdings. This BBS would offer an opportunity to match up the requestors with sources of the needed information without further action by FEMA.
- FEMA can compile a list of alternative sources, such as members of National Flood Determination Association (NFDA) or surveying and engineering firms, as a clearinghouse for copies of older maps and related data. It should be expected that such alternative sources would not necessarily provide copies free of charge.

See Recommendation 4.5.

3.6 Letters of Map Change

The number of applications to change FIRMs by Letters of Map Amendment (LOMAs) and Letters of Map Revision (LOMRs)—collectively referred to as Letters of Map Change or LOMCs—has increased dramatically since the passage of the National Flood Insurance Reform Act of 1994. Tighter enforcement of compliance with mandatory flood insurance coverage requirements has made more borrowers and lenders aware that flood hazards exist, but also has encouraged more people to acquire waivers of the insurance requirements by trying to prove the FIRMs incorrect and applying for LOMCs. LOMAs and LOMRs help improve map quality as updates and corrections are forwarded for FEMA's review. However, the workload associated with responding to the skyrocketing number of such requests has significantly affected FEMA's ability to update and maintain the maps.

To address the increase in applications for LOMCs, FEMA has been investigating the possibility of delegating certain kinds of letters to surveyors, engineers, and other qualified individuals, with final reporting to FEMA and the affected community. FEMA has proposed that work done by the private sector would not become official as a LOMA or LOMR until posted on FEMA's web site and assigned a tracking number. This issue is too important to rush into. Care and study are necessary to find all the repercussions. Areas to be studied include:

- Issues of standard and consistent process among surveyors, engineers, and others to whom these services would be delegated;
- Issues of community notice, acceptance or approval, and attachment to the community's FIRMs; and
- Possible delegation of Conditional Letters of Map Revision (CLOMRs) and LOMRs to Cooperating Technical Communities (CTCs) as long as these documents were formalized by posting on FEMA's web site and assigned a tracking number.

A major and significant concern that has not yet been adequately addressed is the role and responsibility of local government under the NFIP to administer floodplain zoning. Communities must cite or base their floodplain management ordinances on the current FIRMs, and any change to those maps, such as through the issuance of LOMCs, affects the currency and validity of their ordinances. Unless the process of delegation of LOMCs to the private sector requires significant notice to, acceptance by, or approval of local governments, their ability to administer and enforce their own floodplain zoning ordinances could be undermined.

Another issue delegation raises is that FEMA needs to review its regulations for consistency in definition of terms and procedures. Continued conversation between American Congress on Surveying and Mapping (ACSM), American Society of Civil Engineers (ASCE), and FEMA is also crucial. This dialogue must address liability and qualification issues to protect both the public and the professionals to be involved in this work. The present discussions address only A-Zones with an identified BFEs because of legal and technical problems associated with determining and assigning BFEs. An alternative that needs to be explored is permitting local officials to issue LOMAs if the BFE is determined or certified by a licensed professional engineer and the elevation of the land or structure is determined or certified by a licensed professional land surveyor.

Limited delegation of LOMCs can be accomplished without legislation, although the NFIP regulations need regular review to assure they reflect current working practice. The delegation of LOMCs would lighten FEMA's workload and expedite mapping updates.

3.7 Public Involvement: Cooperation and Partnerships with FEMA

Local entities benefit the most when the maps are accurate and up-to-date. With maps that accurately identify the flood risk, new structures and infrastructure can be designed to avoid the flood hazard, and mitigation measures can be taken to protect existing structures. When development is planned to avoid flood risk, citizens' lives and property are protected and the disruption to commerce and public services that occurs with a flood will be minimized. Good maps are beneficial to local entities not only for flood mitigation; the flood data and topographical information also aid in emergency response and recovery planning and in environmental assessments.

Consequently, the Council believes that communities and state organizations need to be more involved in funding and developing the flood hazard maps. Local entities may be more knowledgeable than FEMA or its contractors about local conditions affecting flood hazards, and they may be better prepared than FEMA to deal with local administrative or political considerations that could affect a study. There are numerous opportunities for cooperation and partnerships, some of which are already being pursued.

Project Impact. *Project Impact: Building Disaster Resistant Communities*, a FEMA initiative to encourage local and private partners to proactively take steps to reduce flood losses, provides a natural platform for increasing flood mapping cooperative efforts. The basic principles of Project

Impact recognize the importance of local level decision making, private sector participation, and long-term efforts and investments. Communities and businesses need to be involved in assessing their risks and building disaster resistant infrastructures.

One example of private sector cooperation comes from the Environmental Systems Research Institute (ESRI), a world leader in Geographic Information System (GIS) software and a Project Impact corporate partner. ESRI provides a hazards web site to help Project Impact communities assess their vulnerabilities to natural disasters. The site helps users create maps containing information about flood and other hazard areas. ESRI is also incorporating hazard identification, risk assessment and damage prevention concepts into educational materials.

Cooperating Technical Community (CTC) Partnerships. FEMA's CTC initiative holds promise for increasing community and state involvement. With the CTC initiative, communities or regional or state agencies that have the interest and capability to be active partners in FEMA's flood mapping program enter into a formal agreement with FEMA that identifies the mapping activities they will undertake. The mapping activities address, and should help resolve, many of the issues of concern to the Council. CTC partnerships can be utilized to address a variety of flood mapping activities:

- Analysis of community mapping needs;
- Compiling an inventory of available base maps;
- Adaptation of technical standards specific for a locality;
- Refinement of Unnumbered A-Zones floodplain boundaries;
- Hydrologic and hydraulic (H&H) modeling and mapping;
- H&H review;
- Digital FIRM preparation and/or maintenance;
- Redelineation of floodplains using updated topographic data;
- Digital elevation model/topographic data development;
- Digital base map data sharing; and
- Letters of Map Change.

The objectives of the CTC initiative are to:

- Fully integrate the contributions of FEMA's state, regional, and community partners into the mapping process to provide timely and accurate flood hazard information;
- Maximize limited funding by combining resources;
- Maintain consistent national standards;
- Provide training and technical assistance; and

- Facilitate mentoring for potential partners willing to develop the capability to adequately maintain flood hazard information.

The CTC initiative benefits the local community and the flood program in several ways. Because the flood maps incorporate local knowledge and expertise, they will be more accurate and can be quickly updated. Also, local flood management activities can be enhanced through FEMA's technical assistance, data, and standards. In addition, the local maps will be the same as the FEMA maps. Finally, collaborative efforts with FEMA accomplish more for the CTC partner than independent efforts.

Fiscal Year 1999 was the pilot year for the CTC initiative. During this year, FEMA entered into partnership agreements with 29 partners. Approximately 50% of the partners are state agencies, and the other 50% are communities and regional agencies. Six partners are members of the National Association of Flood and Stormwater Management Agencies (NAFSMA).

A focus on existing organizations such as NAFSMA that consist of communities already involved in flood hazard identification and mapping could help generate successful CTCs. These organizations have the desire, funding, and staff available to contribute to the flood mapping process. FEMA and NAFSMA could work together to develop a mentoring program, presentations, and outreach to others. NAFSMA and other participating organizations will benefit through increased membership and FEMA will gain CTC partners. Such collaboration will be beneficial to all parties.

Flood Insurance Study Process. Other means of involving state and local governments in the flood mapping process need to be explored. Although FEMA has always scheduled coordination meetings with the community and study contractor prior to the Flood Insurance Study (FIS), greater effort needed to be made to ensure meaningful participation by all interested parties. As part of its Map Modernization Plan, FEMA has redesigned the FIS process to involve local government throughout. This process will allow local knowledge of pertinent conditions to be recognized and applicable requirements of stakeholders to be considered. The result will be greater acceptance and approval of the flood maps.

Letters of Map Change. State and local governments might also play a role in the review and issuance of Letters of Map Change (LOMCs). The increase in LOMC requests impacts FEMA's ability to carry out other mapping tasks, and, thus, it may be beneficial to FEMA to delegate authority to localities to issue some kinds of LOMCs in areas where detailed flood elevation information is available.

Mapping Needs Assessment Process. Another opportunity for community involvement in the flood mapping process is through FEMA's Mapping Needs Assessment Process. FEMA implemented this process to provide an inventory of the flood maps in need of updating. Through the process, FEMA evaluates the flood maps for each community at least once every five years. To complete the first 5-year cycle, FEMA has contacted all of the approximately 18,000 mapped communities to request information about local mapping needs. To store, rank, and prioritize the map update needs comparatively, FEMA developed the Map Needs Update Support System (MNUSS) computer database. Some communities, although having a significant need for updating their NFIP maps, will not respond to FEMA's request for information; they will need to

be strongly encouraged to do so. Also, responses from communities that have no technical staff (e.g., planners, engineers, building inspectors) are incomplete or inaccurate and, therefore, FEMA needs to supplement the process with other means of investigating community mapping needs. The Council believes that unstudied communities should also be contacted for information about any historic flood damage.

Streamgage Information. Some state and local governments cooperate with FEMA and the U.S. Geological Survey in developing and publishing USGS streamgage information. USGS stream gages provide a basic building block for the calculation and mapping of riverine floods. Improvement of the streamgage network, with appropriate funding, is critical to the long-term adequacy of data needed to update and revise NFIP maps. Elected officials and their constituencies need to be made aware of the relationship between the continued operation of a comprehensive network of stream gages and accurate flood-hazard mapping. Greater participation is critical to the ability of FEMA to produce accurate maps in the future.

Future Hydrology. Another potential area for cooperation between FEMA and communities and states is in mapping future hydrologic conditions. Parameters could be established for including future hydrologic conditions and exploring alternative regulatory concepts that might improve management of future development in watersheds subject to significant change. The public needs to be made more aware of the benefits of mapping future hydrologic conditions.

Public Education. Finally, FEMA needs to initiate and partner with communities and states to develop programs to better educate the public about flood risks and to encourage the use of multiple information channels. Educated community residents will be more aware of the phenomenon of flooding and can make better decisions when reviewing their community's flood maps. They will understand the real flood risk to their properties and to other local sites and recognize the value of accurate flood mapping to the whole community, not just their property.

More than 18,000 communities are known to face some degree of flood risk. Awareness of the risk by local officials, professionals who work in the community, and citizens varies from community to community. Those who live, work, and play in any community should be aware of the flood risk they face, and must understand that local funding and participation in delineating the risk will pay large dividends to their economy when disaster threatens.

Professional associations and organizations should initiate or enhance public outreach to support the goals of the NFIP and FEMA's Map Modernization Plan and the significant accomplishments that have already been achieved in the mapping processes.

The benefits from public involvement and partnerships with FEMA on flood hazard identification must be measured and reported to demonstrate the advantages gained from this participation. By having others assume responsibility for portions of the flood hazard identification process, federal costs will decrease, local knowledge will increase, and nationally in the long-term, flood losses will decline with better information and more local involvement. FEMA should be encouraged to provide incentives to partners and to track participation and results so that these successes can be celebrated.

3.0 Issues